PTO 10-2208

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445303

METHOD OF PRODUCING AQUEOUS DISPERSIONS OF ACRYLIC COPOLYMERS

[Sposob polucheniya vodnykh dispersii akrilovykh sopolimerov]

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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. FEBRUARY 2010
TRANSLATED BY: THE MCELROY TRANSLATION COMPANY

PUBLICATION COUNTRY	(19):	SU
DOCUMENT NUMBER	(11):	445303
DOCUMENT KIND	(12):	A
LAID-OPEN DATE	(43):	19750505
		Bulletin No. 17
PUBLICATION DATE	(45):	19760519
APPLICATION NUMBER	(21):	1763052/23-5
APPLICATION DATE	(22):	19720323
INTERNATIONAL CLASSIFICATION[2]	(51):	C 08 G 18/04
UNIVERSAL DECIMAL		
CLASSIFICATION	(53):	678.744.3 (088.8)
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		Leather and Footwear Industry
TITLE	(54):	METHOD OF PRODUCING AQUEOUS
		DISPERSIONS OF ACRYLIC COPOLYMERS
FOREIGN TITLE	[54A]:	Sposob polucheniya vodnykh dispersii
		akrilovykh sopolimerov

The invention concerns the field of producing aqueous dispersions that are suitable for finishing natural and synthetic leathers.

There is a known method of producing aqueous dispersions that are based on acrylic copolymers by emulsion copolymerization of acrylic or methacrylic acid esters with vinyl monomers in the presence of an emulsifier and an initiator, in water.

Aqueous dispersions produced by the known method form coatings that are not sufficiently heat resistant or sufficiently resistant to abrasion.

The starting monomers that are used are compounds, of which one contains a urethane group, as a result of which the thermal stability of the end product increases, its resistance to abrasion increases and its strength characteristics improve.

TABLE 1. Properties of coatings on leather produced on the basis of emulsion polymers

Composition of polymer portion	Properties of coatings			
	Thermal stability, °C	Resistance to abrasion on wet leather, number of rotations on an ILK-1	Freeze resistance, points	Bending resistance, number of bends on an IPK-2
EA EA:MAA = 93:7 EA:MMA:MAA = 80:20:3 EA:U = 50:50 (in accordance with proposed method	75 80 100 128	10 20 80 350	5 5 5 5	5000 5000 15,000 25,000

TABLE 2. Mechanical properties of free films produced on the basis of the emulsion polymers

Monomers used for synthesis of emulsions	Film thickness, mm	Tensile strength, g/mm^2	Elongation at failure, %	Stress at 100% elongation, g/mm^2
EA:MAA = 93:7	0.15-0.2	Viscous	Flow	
EA:MMA:MAA = 80:20:30	0.15-0.2	340	1000	30
EA:U = 50:50 (in	0.15-0.2	300	1600	340
accordance with proposed method	0.15-0.2	600	800	280

Notations:

EA - Ethyl acrylate

MAA - Methacrylic acid

MMA - Methyl methacrylate

U - Urethane based on 2,4-toluene diisocyanate and ethylene glycol monomethacrylate ester

The products of the reaction of the monomethacrylic ester of ethylene glycol with 2,4-toluene diisocyanate, hexamethylene diisocyanate or polyisocyanate can be used as monomers containing a urethane group.

Ethyl acrylate, butyl acrylate, methyl acrylate, divinyl, chloroprene may be used as coreagent with the urethane monomer. The highest yield (about 95%) is achieved at a UM-EA = 1:2 ratio. At these values, films and coatings have the best optimum technological characteristics. Production of stable emulsions from acrylic-urethane monomer and ethyl acrylate is assured by using the product of the sulfonation of ethoxylated alkyl phenol neutralized with ammonia as the emulsifier (emulsifier S-10).

When dried in a thin layer, this emulsion forms transparent films, the elasticity of which is defined by a fairly wide temperature interval: freeze resistance 15-18°C, thermal stability greater than 100°C.

Coatings on leather that were produced on the basis of said acryl-urethane emulsion have high gloss, a pleasant silky feel, high resistance to bending and high resistance to the effect of high and low temperatures.

Example. First step of process.

5.5 g 2,4-toluene diisocyanate and 17 g ethylene glycol monomethacrylic ester (MEG) or 9.2 g hexamethylene diisocyanate and 13.3 g MEG in a calculation for NCO/OH = 1:2 are put into a flask that has a ground glass stopper. The mixture is vigorously agitated with a magnetic stirrer for around 6 h at a temperature of 6-20°C. The product is monitored from the concentration of free NCO groups by the amine equivalent method. The process is considered complete when the concentration of NCO groups does not exceed 0.5-1% of the initial level.

Second step of process.

200 mL water are put into a reactor that is equipped with a heating device, stirrer, thermometer and reflux condenser. 22.5 g of the um product obtained in the first step, 52.5 g ethyl acrylate (EA) and 3.75 g emulsifier S-10 are dissolved in a separate container. After the UM has completely dissolved in the EA, the mixture of monomers is transferred to a dispensing device and then gradually fed to the reactor. The stirrer and heater are turned on at the same time. When the temperature reaches 40°C, the first portion of ammonium persulfate (0.375 g) dissolved in 10 mL water is added to the reactor. When the temperature reaches 80°C the second portion of ammonium persulfate (0.375 g in 15 mL water) is added. After this, the temperature of the reaction mixture is maintained at 80°C for 2-3 h. The end emulsion is cooled to 50°C in the reactor with the stirrer running and after this is poured into a container through a filter.

The acryl-urethane emulsion is used as a film forming agent for finishing leather.

Claim

A method for producing aqueous dispersions of acrylic copolymers by emulsion copolymerization of esters of acrylic or methacrylic acids with vinyl monomers in the presence of an emulsifier and an initiator, distinguished in that, with the goal of improving heat resistance, increasing resistance to abrasion and improving strength characteristics of the end products, compounds, one or each of which contains a urethane group, are used as starting monomers.